analysis of volition, and the demonstration of the continuity of reasoning in logic and ethic are substantial contributions to speculation. It is probably in the sphere of practice and in especial in ethic and religion that Dr. Hodgson finds the true task of consciousness as something other than the fly upon the wheel of real conditioning. At any rate the denial of efficiency to consciousness and the attribution of real activity to the organism as such, to the conscious being and not to his consciousness, has not emptied morality of content. Conscience and personality have their meanings, and very full and rich ones in the new system. Conscience as self-consciousness in selective attention is no doubt wholly conditioned by the neuro-cerebral system, but it is the sole criterion of morality, its preferences are perforce imperatives, its judgments as to the anticipated effect of actions upon character are final in scorn of consequence. No system of prudence will satisfy Dr. Hodgson, but only a moral responsibility for character which requires free-will.

His treatment of this well-worn topic is somewhat unconvincing. Inward determination or self-determinism is freedom, and in this sense even the inorganic is partially free, and in each higher organisation of matter such freedom is intensified. And we are not to think that laws of nature "compel"; there is no necessity in the order of real conditioning.

So far, so good. But is this enough? The *de facto* presence of real alternatives in the order of real conditioning is what is required to justify responsibility on Dr. Hodgson's theory, and he will not allow himself to make fallacious inferences from sense of effort and so forth. Does he not tacitly rest the case on the belief that otherwise pleasure and pain, desire and volition, the whole contents of consciousness as such are illusion and inutility? In acknowledging only "apparent design" in nature, and resolving the teleological into the æsthetic judgment, he precludes himself from this escape. The influence of Kant's later critiques is all the more obvious from Dr. Hodgson's antagonism to the earlier.

Out of the moral consciousness arises the religious. And of this Dr. Hodgson is at pains to show the competence and limits.

The fourth book on "The Real Universe" is really a *Religionsphilosophie*. Approached in a characteristically analytical way. Matter or adverse occupancy of space by coherence of parts is composite even in its minima. It must therefore have been produced by non-material real conditions. Either this or the "aseity" not yet proven of matter. It is upon these unseen realities, which through matter their product work in the organism and condition consciousness, that faith fastens. Upon them it projects, in a way satisfying only to the practical reason, those conclusions which religion derives from ethic and completes ethic by. Among other vaticinations in this field consciousness stumbles pathetically upon a theory of an organism formed by the neuro-cerebral system with the growth of character, an organism perchance disengageable at death and capable of a future life with those it has loved and lost—the theory of the authors of "The Unseen Universe." But Dr. Hodgson is severe with himself and will not take any surmise for metaphysical truth.

The strength or the weakness of the system lies in the refusal to attribute agency to consciousness. Where, if it does nothing, and the neurosis all, lies the use of consciousness? and yet if we introduce final causes, what becomes of Dr. Hodgson's system? Or is its sole use the speculatively unjustifiable self-projection into the unseen which characterises the ethico-religious consciousness?

But beyond the significance of any single doctrine of "The Metaphysic of Experience," or even of its central doctrine, is that of its method. Many of its results must hold good, but, were it otherwise, the book would live, because of the unflinching sincerity which is its keynote.

H. W. B.

AN INTRODUCTION TO GEOLOGICAL SCIENCE.

Geology for Beginners. By W. W. Watts, M.A., F.G.S. Pp. xvii + 352. (London: Macmillan and Co., Ltd. 1898.)

THE progress of science demands from time to time new text-books by fresh workers, and in the handy little volume before us we have presented to us the leading facts and principles of geology concisely explained and well illustrated by the light of the most recent researches. The author himself, one of the most energetic of observers and teachers, and with a varied experience both in the field and laboratory, has made excellent use of his opportunity, and in this "Geology for Beginners" he has given to the earnest student one of the best introductions to the science ever published. There are other works on elementary geology which will prove more fascinating to general readers, who seek to become acquainted only with the principles of the science; but those who desire to master the subject must enter into details, and they will do well to follow step by step the instructions given by our author.

From the study of a few selected examples of rock at home, he leads us to the study of rocks and rock-structures out-of-doors. We are then taught to observe the wear and tear of rocks by various agencies, and to understand the formation of gravels, sands, and clays, including in course of time the mode of origin of crush-conglomerates. The action of compressed air on sea-coasts, and many other little matters, not usually explained in text-books, are introduced to our notice. In all information relating to mineralogy and petrology, to metamorphism and earth-movements, the author's statements are clear, and as full as need be for an elementary student. Each chapter is divided into paragraphs with bold headings, and at the end there is a recapitulation which is followed by a series of questions. The author has planned his work on the revised syllabus of the Science and Art Department, and the questions which he quotes are those which have been set by that Department and by the Oxford and Cambridge Schools' Examination Board.

Throughout the volume the subjects are illustrated by diagrams, by photographs of hand-specimens and microscopic slides of rocks, and by photographs of natural exposures of rocks. In the chapters relating to the successive geological periods there are numerous figures of fossils. In most cases the names of the genera only are

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given, but in some instances the names of the characteristic species are also mentioned. This portion of the work would, we think, bear amplification in a new edition. We note that *Eozoon* is abandoned as a fossil. The Archæan system is regarded as Eozoic, as the bands of limestone and graphite which it contains are probably of organic origin, while among the Longmynd rocks "obscure traces referred to worm-tracks and trilobites have been found."

Concluding chapters deal with the origin of landscape, with escarpments, base-levels, &c., and there is a brief outline of economic geology. Too little attention is perhaps, as a rule, given to this last professional aspect of geology; but in his introduction the author rightly observes:

> "Pursuing these studies we are brought into contact with constituents of the earth's crust which are of value in the arts and manufactures, and it is our business to learn about them, where they are found, and how they were formed, and if possible to point out where similar things may be found elsewhere."

Applied geology must of course be based on the firm footing of science—on a foundation the main features of which are so ably delineated in the present little volume.

OUR BOOK SHELF.

Plant Life, considered with special reference to Form and Function. By Charles Reid Barnes, Professor of Plant Physiology in the University of Chicago. Pp. vii + 428. (New York: Henry Holt and Co., 1898.)

IT is rather difficult to speak with justice about Prof. Barnes' little book. The idea, set forth in his preface, of attempting to give a general and somewhat philosophical account of plant life such as shall be useful to young readers, is an ambitious one, and the author has, here and there, almost realised parts of it. But we must confess that, taken as a whole, the book is not satisfactory—it is more provocative of yawning and somnolence than keen interest. At times, too, it is amazingly behind the times. The discredited figures of centrosomes are reproduced with a fidelity worthy of a better cause, and the account given of the ascent of sap is worse than misleading. Some of the figures, too, are very bad, and it is difficult to see the use of a delineation of a *Fucus* egg, such as presented in Fig. 42.

The physiological part is in some respects, perhaps, less open to objection than much of the rest of the volume; but here also there is a deal of useless talking round points, giving wordy definitions instead of definite ideas. What is the good of telling young students that irritability is the power of responding to a stimulus, without giving them some idea of what a stimulus itself consists? Quite enough knowledge of chemistry is presupposed in the earlier chapters to have warranted a more precise explanation of the nature of a stimulus than "the external change which brings about the reaction"; and the metaphor of the trigger and loaded gun ought to be carefully explained, if it is to be put before young readers.

These are a few of the defects which mar the execution of a task perhaps almost impossible of fulfilment within the compass of a small book; but if the author has not, at least in our judgment, succeeded in writing a book pre-eminently useful for students, it may, as a kind of note-book, prove of service to young teachers. The volume ends with tolerably good appendices containing directions for laboratory work and the collecting of suitable material for study.

Stories of Starland. By Mary Proctor. Pp. 186. (New York: Potter and Putnam Co. London: G. W. Bacon and Co., Ltd.)

TO write a book in a conversational style for the instruction of children requires a deal of art and close familiarity with the curious workings of young minds. Books of this kind have usually to be classed as failures, and the present volume only rises in parts above their level. In the first place, few of the illustrations will interest children, and the figures of Mars on p. 69, and of the Orion Nebula on p. 157, are in no way satisfactory. Then the children's questions and answers are too ready and apt for an average child to follow or retain in his mind. Thus, on the four pages 20–23, Master Harry, who plays the part of the inquiring boy, has impressed upon him that it would take a train nearly one hundred and seventy-five years to get to the sun, that at the rate of two cents a mile the fare would be nearly two million dollars, that walking at the rate of four miles an hour for ten hours a day the journey would occupy more than six thousand years, that a cannon ball would take nine years to reach the sun, and the sound of the explosion fourteen years, and that if an imaginary long arm touched the sun, the pain of burning would not be felt for one hundred and fifty years on account of the time taken in the transmission of sensation through nerves.

Now all this may be very well in a popular lecture in a country village, for grown-up people sometimes like to be impressed by statistics of the millions upon millions, type, but it has no educational value whatever, and is entirely out of place in a volume intended for the instruction of children. In fact, Miss Proctor makes the common mistake of crowding too many uninteresting details into her book, and of describing too many appearances which her pupils will be unable to see for themselves.

By far the best part of the volume is that in which the chief constellations are described, and the legends connected with the constellation figures are related. These star-stories from the mythology and folk-lore of different peoples are better suited to the mental condition of a child than the descriptions of petty details concerning planetary motions and appearances.

A number of short poems of variable quality are interspersed through the pages, and may help to relieve the narrative when children of poetic temperament are the readers or listeners.

Canalisations électriques. By R. V. Picou. Pp. 172. (Paris: Gauthier Villars. Masson et Cie.)

DETAILS concerning the erection and working of aerial lines for electric currents are given in this volume, which belongs to the well-known Aide-Mémoire series. The first part of the volume includes descriptions of the wires used, the various forms of insulators, and different kinds of posts and supports used to carry the wires; the second part is concerned with the mounting of lines, all the details as to earths, tension, and protection against electrical and other disturbances being dealt with. In the third part of the volume the chief formulæ and tables used by electrical engineers engaged in wiring work are brought together.

Contributions a l'Étude de l'Hérédité et des Principes de la Formation des Races. By J. M. Harraca. Pp. 172. (Paris: Félix Alcan.)

HERE and there in this little volume the reader will find an interesting point referring to facts or views bearing upon heredity, but the search for this material for thought in a waste of words is very wearying. The author writes with apparent conviction that he has new things to say, and he certainly does express some ideas which appear to merit consideration, so that students of heredity may find it worth their while to glance through the volume.

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